

STUDIES IN LITERATURE AND LANGUAGE
Vol. 1, No. 5, 2010, pp. 53-65

ISSN1923-1555
www.cscanada.net
www.cscanada.org

Schema-building and Listening

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Abstract: This paper seeks to review the linkage between schema-building and listening learning. It commences with an overview of the two constructs “listening” and “schema” followed by an analysis of benefits of schema-building on language learning as the major theoretical framework.

Keywords: schema; schema theory; listening; language acquisition; motivation

1. LISTENING

1.1 Defining listening

Listening has been defined from different points of views. Listening is “the active and dynamic process of attending, perceiving, interpreting, remembering, and responding to the expressed needs, concerns, and information offered by other human beings” (Purdy, 1991, p.11). Listening is also, according to Rubin (1995), seen as “an active process in which a listener selects and interprets information which comes from auditory and visual clues in order to define what is going on and what the speakers are trying to express” (p.151). Imhof (1998) views listening as an “active process of selecting and integrating relevant information from acoustic input and this process is controlled by personal intentions which are critical to listening” (p.83). Buck (2001) argues that “listening involves both linguistic and non-linguistic knowledge” (p.247). In others words, linguistic knowledge relates to “knowledge of phonology, lexis, syntax, semantics, discourse structure, pragmatics and sociolinguistics, whereas non-linguistic refers to “knowledge of the topic, the context and general knowledge about the world and how it works” (p.247). What is more, listening is said to be equal to ‘experiencing contextual effects’; that is, ‘listening as a neurological event (experiencing)’ overlays a cognitive event (creating a change in a representation) (Rost, 2002, p.3). Finally, Jeon (2007) explains listening in detail that “listening has been characterized as a set of activities that involves an individual’s capacity to apprehend, recognize, discriminate, or even ignore certain information. It has also been considered to contain complex and active processes that are involved in linguistic knowledge, personal expectation, cognitive processing skills, and world knowledge. Listening involves interaction and negotiation with a speaker and requires prior experience of a listener to best understand and interpret what a speaker says” (p.50).

1.2 The teaching and learning of listening

In spite of the fact that “listening is the most frequently used language skill in everyday life” (Celce-Murcia and Olshtain, 2000, p.102), it is found to be overly difficult to be taught by teachers of English. Traditionally, a teacher plays a tape, asks his/her students to listen and then checks the students’ answer

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*Received 3 June 2010; accepted 15 August 2010

whether they are correct or incorrect. It means that the teacher controls the listening class all the time while the students meekly do what the teacher tells them to do. Furthermore, “teachers often overlook the process of helping students learn to listen” (Meldelsohn, 1994; Sheerin, 1987; Vandergrift, 2004 as cited in Chen, 2009, p.55); and “moreover, students passively rely on teachers’ instruction, and seldom realize that they themselves must be active in their listening and learning to listen (Goh and Taib, 2006; Vandergrift, 2003 as cited in Chen, 2009, p.55). This should be changed because Harden and Dent (2005) insist that “the purpose of teaching is to facilitate learning” (p.209). They also maintain that “the teacher needs to ensure that the teaching/learning session is not given over solely to the providing of information and the building knowledge; it is not only knowing *that* or *what*, but knowing *how* and *why* which is important to the student” (p.208). Chen suggests that teacher in listening classes should “shift the attention from test-oriented teaching toward more student-oriented instruction, in which the key focus is on helping students to develop their listening strategies and learn how to actively listen” (p.55). Listening actively means that the students are responsible for their listening learning, i.e., bring their interest, their life experience, what they already know, and so on and so forth into the listening class. Zeidler (2003) contends that “the teacher’s role is to be aware of the diversity in student understanding (based on how well students integrate new ideas into existing schemas³) and to provide the range of learning activities that allow for differences in conceptual understanding” (p.126) so that he/she helps them to be ‘actively involved in listening’ instead of ‘passively receiving input’ (Chen, 2009, p.73). As for Anderson and Lynch (1988), it means that the student becomes an ‘active model builder’ (p.11), rather than a ‘tape recorder’ (p.9).

Thus, “it is important for the student to be thinking about the material. It is the responsibility of the teacher, as facilitator of learning, to encourage students to be thinking about the material presented and attempting to relate it to what it is already known, to work out what it means in their own context, and to think about ways in which it might prove to be useful future application. In so doing students are not only creating meaning and constructing knowledge but are actually strengthening their own learning skills” (Harden and Dent, 2005, p.208).

2. SCHEMA

2.1 Definitions of schema

Researches have given a large number of different definitions of schema (plural of schemas or schemata). Rumelhart (1980) defines schemas as “building blocks of cognition” (p.34) and “skeleton around which the situation is interpreted” (p.37). “A schema is a cognitive structure that consists in part of the representation of some defined stimulus domain. The schema contains general knowledge about that domain, including a specification of the relationships among its attributes, as well as specific examples or instances of the stimulus domain” and “the schema provides hypothesis about incoming stimuli, which include plans for interpreting and gathering schema-related information” (Taylor and Crocker, 1981, p.91). For Alba and Hasher (1983), schema is “general knowledge a person possesses about a particular domain” (p.129). Brewer and Nakamura (1984) explain that “schemas are the unconscious cognitive structures that underlie human knowledge and skill” (p.136). Cohen et al (1993) define schemas as “packets of information stored in memory representing general knowledge about objects, situations, events, or actions” (p.28). Cook (1997) regards schema as “a mental representation of a typical instance” (p.86). The following is an example of schema for “mall”:

For example, the statement “We went to the mall” would activate one’s schema for “mall”. Mall is an *abstract concept* that has several characteristics: it is a very large, enclosed structure containing stores, movie theaters, and restaurants; it has a large parking lot, etc. Each of these properties has a particular *slot* in the mental schema for “malls.” These are arranged *hierarchically*, so that the slot for “stores” is subdivided into department stores, specialty shops, clothing stores, and so on. Each time an individual goes to a mall, *instatiation* occurs through the matching of experience with schema. (...). Finally a person’s schema for “malls” comes

³ Schema: (plural schemas or schemata) “generalized collections of knowledge of past experiences which are organized into related knowledge groups and are used to guide our behaviors in familiar situations” (Nisida, 1999, p.755).

from personal experiences of shopping in them through a process of *induction*. A person who has been to many malls or who shops at them frequently will have a more developed schema than someone who has only been once or twice.

(Wolvin and Coakley, 1993, p.63)

Another example is the following relatively detailed visual representation of an "egg" schema:

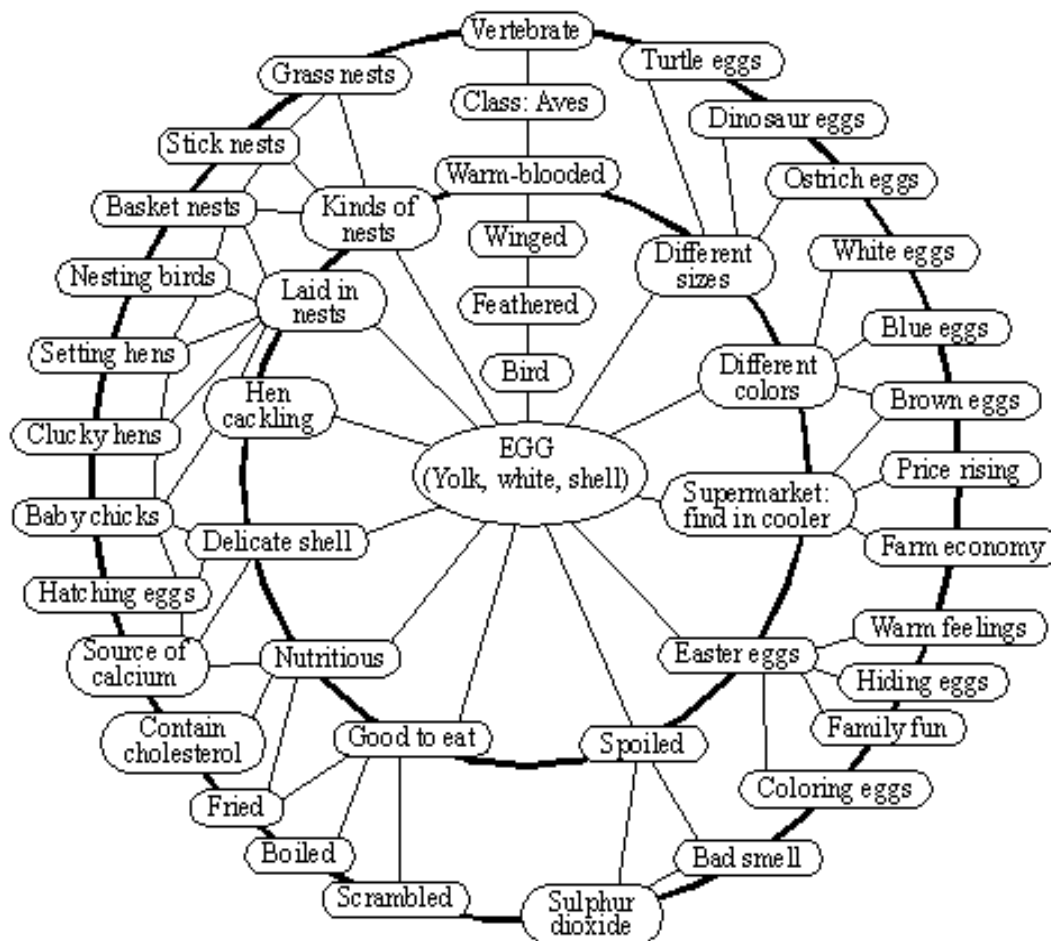


Figure 1: A diagram of someone's possible schema for the concept of "egg."

(Source: <http://www.solidstateux.com/>)

2.2 Characteristics of schema

The following are some special features of schema according to Anderson, (1997, p.418-419):

- Schemata are always organized meaningfully, can be added to, and, as an individual gains experience, develop to include more variables and more specificity.
- Each schema is embedded in other schemata and itself contains subschema.
- Schema change moment by moment as information is received.
- They may also be reorganized when incoming data reveals a need to restructure the concept.
- The mental representations used during perception and comprehension, and which evolves a result of these processes, combine to form a whole which is greater than the sum of its parts.

2.3 Types of schema

Schemata are classified into two types: content schemata and formal schemata (Carrell, 1983). The former refers to “background information” on the topic and the latter relates to “knowledge about how discourse is organized with respect to different genres, different topics, or different purposes (e.g., transactional versus interactional), including relevant sociocultural knowledge” (Celce-Murcia and Olshtain, 2000, p.102). Besides, Juan and Flor (2006) insist that “content schema are networks of knowledge on different topics and formal schema are derived from our knowledge of the structure of discourse is being listened to make it easier to engage in top-down processing strategies, such as predicting and inferencing” (p.93). Carrell and Eisterhold (1988) assert that listeners lack culture-specific content schema seriously. It is of importance that “in English listening, the content schema must be activated for the learners to access their prior knowledge” (Lingzhu, 2003, p.9).

3. FOUNDATIONS OF SCHEMA

Schema is considered as one of the most important elements of cognitive theories of learning and “schema theory is one of the most intellectually exciting areas of current cognitive psychology” (Brewer and Nakamura, 1984 as cited in Wolvin and Coakley, 1993, p. 64). Schema is greatly used in cognitive psychology, and there still hasn’t been a consensus about the father of schema theory. However, it has been said that “the idea of schema is one of the most important concepts in cognitive science” (Rumelhart, Smolensky, McClelland and Hinton, 1986 as cited in Xie, 2005, p.67). Hui (2005) says that “schemata are abstract cognitive constructs where knowledge is processed, stored and activated” (p.18). Thus, a lot of researchers have applied schema to study reading and speech. Xie (2005) writes that

Modern schema theorists believe that schema, a data structure of general structure of general ideas stored in memory, consists of variables and slots. According to such a principle, meaning exists neither in oral nor in written language itself, but in the reader’s mind, depending on the activation of his or her brain schemata whose controlling structure or basic moving pattern is navigated through bottom-up data-driven-processing and top-down concept-driven-processing (p.67).

He also adds that “top-down processing facilitates the assimilation of new information into the information already stored” (p.68). In fact, cognitive psychologists have opinion that “all of a person’s prior knowledge was stored in the cognitive structures of the brain. Therefore, in order for acquisition of new knowledge to take place and to be meaningful, prior knowledge or schema needed to be activated within these structures by means of an introductory instructional strategy (Ausubel, 1987; Ivie, 1998; Joyce and Weil, 1986; Kalmes, 2005; Postrech, 2002 as cited in Daniel, 2005, p.1). From bottom-up and top-down perspectives, Rost (2001) shows that “listening involves ‘bottom-up’ processing, in which listeners attend to data in the incoming speech signals, and ‘top-down’ processing, in which listeners utilize prior knowledge and expectations to create meaning” (p.7). Moreover, Vandergrift (2004) argue that

listeners use top-down processes when they use context and prior knowledge (topic, genre, and other schema knowledge in long-term memory) to build a conceptual framework for comprehension; listeners use bottom-up processes when they construct meaning by accretion, gradually combining increasingly larger units of meaning from the phoneme-level up to discourse-level features (p.4).

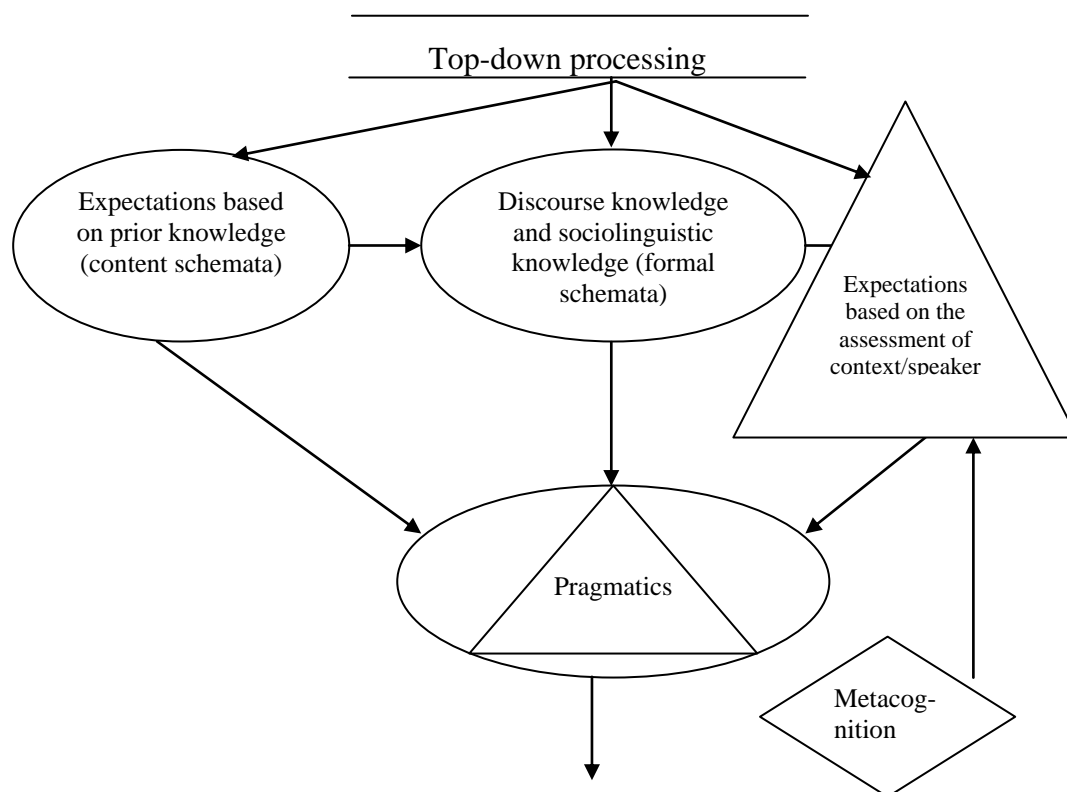
Research from the two cognitive processes suggests that it is necessary for listeners to learn how to use these processes effectively based on different listening purposes. It is agreed that “bottom-up processing is applied to gather information on phonology, lexis, syntax and grammar to build up an understanding of what is perceived. Top-down processing, however, makes use of previous knowledge and experience (schema) to predict, filter, analyze and interpret the information received” and top-down processing emphasizes the importance of listener’s background knowledge” (Nunan, 2007, p.32), and “in top-down

processing we rely on what we already know to help make sense of what we hear” (Juan and Flor, 2006, p.93). More importantly, Eysenck (2001, cited in Nunan, 2007) asserts that “both top-down and bottom-up processing occur at the same time in what is known as parallel processing.”

Lastly, psychologists have done a number of experiments in order to prove that human’s cognition is related to schema and is affected by knowledge stored in one’s mind (Brewer and Treyns, 1981). “Schemata, the relevant packages of prior knowledge and experience that we have in memory and can call on in the process of comprehension” (Juan and Flor, 2006, p.93). From this point, it may be inferred that listening comprehension are more or less influenced by prior knowledge. (see Diagram 2.2)

4. SCHEMA THEORY

Schema theory is “a theory about knowledge” and about “how knowledge is presented and how their representation facilitates the use of knowledge” (Rumelhart, 1980, p.34). In addition, Edwards and McDonald (1993) observed that “schema theory is concerned with the organization of information in memory and how existing knowledge influences the encoding of new information and its retrieval from memory” (p.75). Schemas are very essential not only for interpreting information but for decoding how that information is organized as well. Orasanu (1986) asserts that “the schema theory highlights the fact that more than one interpretation of a text is possible. The schema that will be brought to bear on a text depends on the reader’s age, sex, race, religion, nationality, and occupation. In short, it depends on the reader’s primary cultural reference group” (p.34).



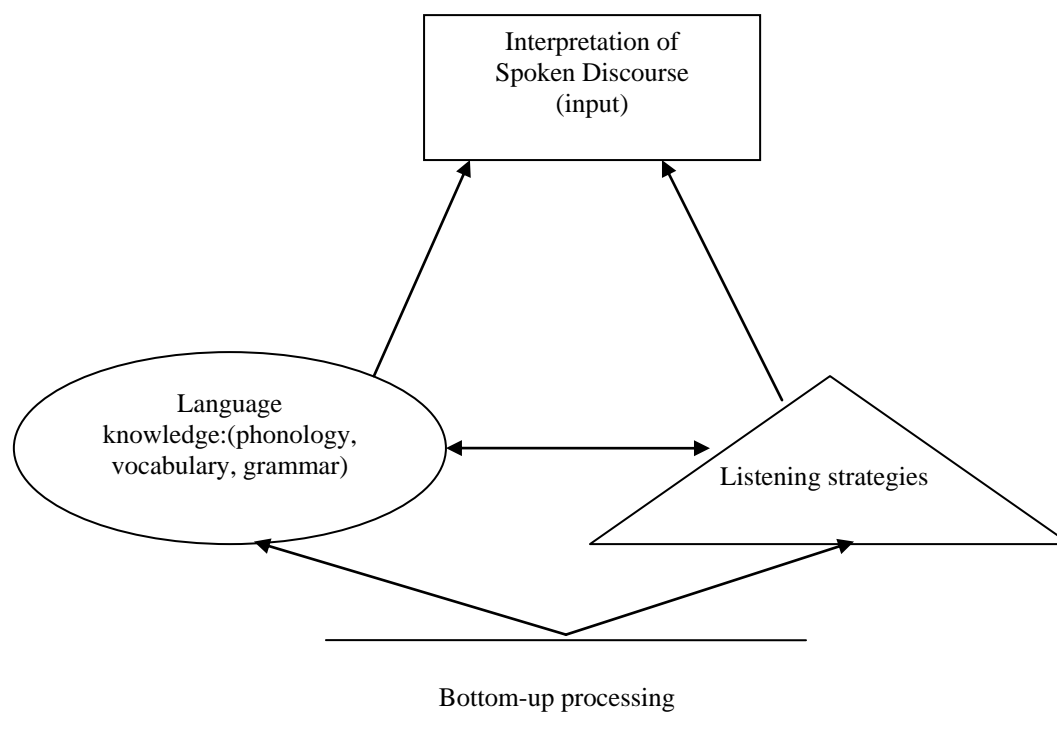


Figure 2: Speech Reception framework by Celce-Murcia and Olshtain (2000, p.104)

The first outline of schema theory was developed in 1932 by Bartlett, who pays much attention to the role of memory. He argued that memory is an active process, not reproductive, but constructive in its operation. What we already know shapes our understanding when we encounter something new. “The schema is the ‘the mental map’ or set of mental connections we had in our head about a particular idea of thing” (Myhill, Jones and Hopper, 2006, p.21). Therefore, Orasanu (1986) demonstrates that according to schema theory, listening involves “more or less simultaneous analysis at may different levels – from the textual levels of graphophonemic, morphemic, semantic, and syntactic features, to the experience-based levels of knowledge of specific content, pragmatics, and interpretive thinking” (p.35).

Edwards and McDonald (1993) showed that “schema theory details how people store and use knowledge about a domain. The theory predicts what information people will select for memory storage, that information will be abstract, and that the information will be interpreted in light of existing knowledge and integrated into the existing network” (p.60). Indeed, the existing knowledge significantly affects listening learning as well as listening comprehension of students.

5. BENEFITS OF SCHEMA-BUILDING

5.1 Schema and second language acquisition

Underwood (1989, cited in Osada, 2004, p.62) offers seven conceivable causes of obstacles to efficient listening learning:

1. Listeners cannot control the speed of delivery. Many English language learners believe that the greatest difficulty with listening comprehension, as apposed to reading comprehension, is that the listener cannot control how quickly a speaker speaks.

2. Listeners cannot always have words repeated. This is a serious problem in learning situations. In the classroom, the decision as to whether or not to replay a recording or a section of a recording is not in the hands of students. Teachers decide what and where to repeat listening passages; however, it is “hard for the teacher to judge whether or not the students have understood any particular section of what they have heard.
3. Listeners have a limited vocabulary. The speaker may choose words the listener does not know. Listeners sometimes encounter an unknown word, which may cause them to stop and think about the meaning of that word and thus cause them to miss the next part of the speech.
4. Listeners may fail to recognize the signals, which indicate that the speaker is moving one point to another, giving an example, or repeating a point. Discourse markers used in formal situations or spontaneous conversations, *signals* are more vague as in pauses, gestures, increased loudness, a clear change of pitch, or different intonation patterns. These signals can easily missed especially by less proficient listeners.
5. Listeners may lack contextual knowledge. Sharing knowledge and common context makes communication easier. Even if listeners can understand the surface meaning of the text, they may have considerable difficulties in comprehending the whole meaning of the passage unless they are familiar with the context. Nonverbal cues, such as facial expressions, nods, gestures or tone of voice, can also be easily misinterpreted by listeners from different cultures.
6. It can be difficult for listener to concentrate on the text. In listening comprehension, even the shortest break in attention can seriously impair comprehension. Concentration is easier where students find the topic of the listening passage interesting; however, students sometimes feel listening very tiring even if they are interested because it requires an enormous amount of effort to follow the meaning.
7. Students may have established certain learning habits, such as a wish to understand every word. By tradition, teachers want students to understand every word they hear by repeating and pronouncing words carefully, by grading the language to suit their level, by speaking slowly and so on. Consequently, students tend to become worried if they fail to understand a particular word or phrase and they will be discouraged by the failure. It is thus sometimes necessary for students to tolerate vagueness and incompleteness of understanding.

From observing the difficulties students often have, it is suggested that schema building activities help them overcome these troubles. Goh, (2002) and Nunan (2007) argue that “comprehension relies on listeners’ successful activation of their prior knowledge (schemata)” (p.35), and suggest some following techniques to activate stored or existing schemata as displaced in Table 2.1:

Table 1: Techniques to activate stored schemata

Activity	How to do	Purpose
Brainstorming	Call out related words or phrases to be put on the board or OHP	Those knowledge-oriented activities aims to prepare students by encouraging them to activate stored schemata or acquire relevant types of world knowledge, which will facilitate top-down processing.
Mind-mapping	Write down words or draw simple pictures in a web	
Discussion	Discuss similar or related issues based on prompt questions or pictures	
Games	Simple word or information-gap games	
Guided-questions	Guess answers to question on the text	
Picture/Diagram	Complete illustrations with simple drawings or words	
Prediction	Predict contents, characters, setting or sequence of events	
Elimination	Identify the odd one out from a group of pictures or words/phrases	
Skimming	Read a related short text for gist	

Furthermore, Underwood (1989, pp.35-43) suggests some more activities in order to activate listener's prior knowledge and help them acquire second language, especially listening learning and comprehension more easily and effectively as follows:

- looking at pictures and talking about them;
- looking at a list of items, thoughts, etc.;
- making lists of possibilities, ideas, suggestions, etc.;
- reading a text;
- reading through questions (to be answered while listening);
- labeling a picture;
- completing part of a chart;
- predicting/speculating;
- previewing the language which will be heard in the listening text;
- informal talk and class discussion.

Thanks to the activities, second language acquisition becomes easier and quicker in that schema-building stimulates listeners to use what they already know and integrate the previously achieved knowledge into acquiring new knowledge. In fact, "when a schema already exists for the topic, the "new" information becomes indistinguishable from the "old" information" (Wolvin and Coakley, 1993, p.64), which indicates the important role of schematic knowledge in second language listening learning. Because of this, Fitch and Hauser (1990 cited in Hargie, 1997) state that "another way of examining the acquisition of information in spoken messages may involve the use of schemas (p.245). "A schema is an individual's collection of prior knowledge that provides a context for meaningful interpretation of new information" (Anderson, 1984 in Hunt and Touzel, 2009, p.57) and "schemas change with the accretion of new knowledge and the tuning and reconstruction of prior schemas" (Carlo and Edwards, 2005, p. 148).

More importantly, Edwards and McDonald (1993) observed that schemas "help process information by reducing processing load" (p.60). They also highlight that the richness of a schema affects listening positively for messages that add new information to an existing schema and schemas are particularly helpful for listening during conversation and when a message is complex since they aid in reducing processing load. Thus, Nasida (1999) argues that "the more often a person repeats a schema-based behavior, the more likely the schemas will be stored in the person's memory" (p.746). Nunan (2007) states that "it is beneficial for listening course teachers to bear in mind that activating students' stored knowledge structure (schemata) to enhance comprehension and creating new schemata are far more important than imparting new knowledge of the language system" (p.33).

5.2 Schema and classroom participation/interaction

Brown (2006) suggests that "it is just as important to give the students the opportunity to use what they already know – their prior knowledge – to help them do the task" (p.4), which means that schema-building involves learners' participation and interaction. It can be said that the more a teacher uses the above schema-building activities, the more positively and actively listeners participate and interact during pair-work and group-work tasks. What's more, it is claimed that class discussions which focus on topics "offer English learners rich exposure to new vocabulary and use, along with opportunities to interact in a variety of academic situations - reporting information, summarizing, synthesizing, and debating" (<http://www.austicc.edu>). Therefore, the students need to be stimulated, and given the opportunity to apply acquired knowledge in such activities as analysis, synthesis, evaluation and problem solving. Outcomes relating to attitudinal and emotional aspects to be performed also need to be remembered; interaction between students in an exchange of views often needs to be fostered by the teacher so that conflicting views can be considered and resolution achieved" (Harden and Dent, 2005, p.208).

5.3 Schema and motivation

Successful listening learning is partially determined by motivation to be most likely achieved due to schema-building. Brown, (2000) states that “a listener will be successful with the proper motivation” p.143); “the role of motivation in the successful acquisition of the target language” is studied by Richard (1990, p.53). It is, therefore, rather essential for listeners to be stimulated and encouraged to learn by the teacher and them. Brother (1978) finds out that “motivation is a basic principle of all kinds of teaching - the language student is best motivated by practice in which he senses the language is truly communicative, that it is appropriate to its context, that his teacher's skills are moving him forward to a fuller competence in the foreign language” (p.47).

“Students will find their English lessons more stimulating if some of their English work is concerned with the things that interest them, so teachers will have to find out what these things are” (Underwood, 1987, p.27). “The motivation for listeners should be pleasure, interest and growing confidence at being able to understand the spoken language” (Byrne, 1976, p.15). Brown (2006) “it is just as important to give the students the opportunity to use what they already know-their prior knowledge - to help them do the task.” Furthermore, “it really doesn’t matter whether the words actually will appear in the listening task because activating prior knowledge, in addition to helping comprehension, motivates students by bringing their lives to the lesson” (p.4)

Harden and Dent (2005) assert that “It might be that the new material to be presented will need activation of more than one set of existing knowledge structures”, which means “pulling together previously acquired knowledge from several different areas of experience” (p.207). Hence, this schema activation is “important in the learning experience that teachers need to consider much more carefully how to help learners prepare for the session and how to begin the session to ensure maximum readiness for the new material to be presented” (p.207). Moreover, Brown and Smith (2007) suggest that listeners need to be active; and when they listen, remember to do these things:

- (1) Think about what you are listening to
 - What is the topic?
 - What do you already know about the topic?
- (2) Think about what you are listening for
 - What do you need to know?
 - What do you need to do?

(p.2)

Lingzhu (2003) states that after the listeners answer the above questions, they themselves build their own expectations about the coming information and their prior knowledge on the topic is activated at the same time.

5.4 Schema-building and listening comprehension

There have been relatively few empirical researches on the possible link between schema building and listening comprehension. Researchers have claimed that schematic knowledge facilitates listening comprehension and helps listeners deal with barriers in listening learning. Rost (2002) states that the listeners have numerous sources of information which make listening comprehension easier. In other words, listening comprehension is influenced by the information that an individual has in the mind or from stores of memory; therefore, schematic knowledge is overtly beneficial to listening comprehension and “relevant schemata must be activated” (Carrel, 1988a, p.105).

O’malley and Chamot (1989) shows that “listening comprehension is an active and conscious process in which the listener constructs meaning by using cues from contextual information and existing knowledge, while relying upon multiple strategic resources to fulfill the task requirement” (p.420); and Long’s (1989)

idea that “comprehension that are based on learner’s ability to draw on their existing knowledge” (p.32) helps a lot to do this research. “Listening comprehension is regarded theoretically as an active process in which individuals concentrate on selected aspects of aural input, form meaning from passages, and associate what they hear with existing knowledge” (Fang, 2008, p.22); therefore, appropriate schemata need to be activated during text processing so as to facilitate efficient comprehension (Carrell and Eisterhold, 1998).

Jeon (2007) writes that “Markham and Latham (1987) conducted their research to assess the influence of religious-specific background knowledge on listening comprehension of adult ESL students” (p.90). Sixty five ESL students who were classified as Muslim, Christian, and neutral, participated in the study. The analysis of recalled data from Markham and Latham’s research demonstrated that the “students adhering to a specific religious group recalled more ideas, and produced more appropriate elaborations and fewer inaccurate distortions regarding passages associated with their particular religion” and she emphasizes that “background knowledge does significantly influence ESL students’ listening comprehension” (p.90).

Long (1990 as cited in Jeon, 2007) highlights the need to investigate how background knowledge influences auditory comprehension in second language. Results from her survey and recall protocols which were collected from 188 students taking a Spanish courses show that background knowledge could help L2 listening comprehension, and that linguistic knowledge played a prominent role in comprehension when appropriate background knowledge was not available to L2 listeners (p.92).

Schmidt-Rinehart (1994) carried out a research to find out whether there was an interaction between topical knowledge and L2 listening comprehension. Because the effect of background knowledge on listening comprehension is not clear cut when it involves L2 listening ability, she expanded the research of Long (1990) by adding proficiency level as a variable, the results collected from ninety university students of Spanish classes of different levels of proficiency, taking immediate recall-protocols showed that topic familiarity had impacts on the scores of the recall measures and that there was an a consistent increase in comprehension scores across the different levels. Nevertheless, the results also demonstrated no relation between such two variables as topic familiarity and course level; i.e., L2 listening proficiency, which disclosed that all students of different course levels scored higher on the familiar passage.

In addition, the effect of prior knowledge was examined by Jensen and Hasen (1995). They hypothesized that students’ prior knowledge could bias the tests. After having studied the results of 128 university level L2 learners, they concluded that prior knowledge does not dramatically contribute to L2 listening comprehension, and that more investigation would be needed to investigate whether schematic knowledge really facilitates listening comprehension.

Recently, Hohzawa (1998 as cited in Jeon, 2007) “found, by studying 58 Japanese English learners, that listeners with high prior knowledge understood more familiar text than unfamiliar text and more proficient L2 listeners understood more than less-skilled listeners in either familiar or unfamiliar text. Students were assigned to a background-information group (experimental group) and to a no background-information group (control group). A proficiency test was given to measure their prior knowledge about the topics of three new stories. Students in the experimental group discussed the content of the stories briefly after the introductions of the new stories were provided. Collected scores from a written recalled-protocol and a comprehension test revealed that students who lacked background information tended to produce more instances of inaccurate recall of the text or distortions, which was similar to findings of Markham and Latham (1987)” (p.94).

As presented in the above research, the findings of L2 listening researches on the impacts of schematic knowledge has on listening comprehension is still rather controversial. The findings of inconclusive role of schematic knowledge in listening comprehension supported the need and design of the further study, main purpose of which was to investigate to what extent schema-building activities have impacts on listening comprehension.

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